II. Research Proposal

The regulations require the completion of a research proposal before your research license application can be considered. If you completed a Pre-Application and Pre-Application Research Proposal and want to certify your Pre-Application Research Proposal for use as your research proposal on this research license application, you must complete all provisions of the research license application and submit a copy of your Pre-Application Research Proposal. As the Primary Applicant, you will be given the opportunity to certify your request in the Acknowledgment Section below. **To be able to certify your Pre-Application Research Proposal, the Primary Applicant must be the same individual that completed the Pre-Application and Pre-Application Research Proposal.**

Your research proposal must explain the research you plan to conduct on behalf of the Kansas Department of Agriculture. Your research proposal will play an important role in the evaluation of your research license application and approval to participate in the Program.

Below are possible research topics that may be useful areas of study. Once you have determined the area of your research, explain in detail, on the following pages, the specific subject your research will cover.

- Agronomic research and analysis of soils, growing conditions or water usage required to successfully grow industrial hemp.
- Research on types of industrial hemp seed that are best suited to be grown in Kansas, including seed availability, creation of hybrid seed types, in-the-ground variety trials and seed production.
- Agronomic research and analysis of the most efficient types of equipment and techniques for seeding, tillage or harvest.
- Agronomic research and analysis of the most effective, economical and environmentally beneficial pest control or fertilization products or methods.
- Analysis of the management techniques and/or environmental factors that impact the delta-9 tetrahydrocannabinol (THC) concentration in industrial hemp.
- A study on the feasibility of attracting federal and private funding for industrial hemp research.
- Analysis of the economic feasibility of developing markets for the various types of industrial hemp that can be grown in Kansas.
- Research and analysis of the most efficient types of equipment and techniques for transporting industrial hemp plants, plant parts, grain or seeds.
- Analysis of the estimated value-added benefits, including environmental benefits, that Kansas businesses would reap by having an industrial hemp market of Kansas-grown industrial hemp varieties.
- Research and analysis of the most efficient types of equipment and techniques for processing industrial hemp plants, plant parts or grain.
- Analysis of the economic feasibility of developing markets for varieties of industrial hemp seed in and beyond Kansas.
- Research into the development of national and international markets for Kansas-grown industrial hemp and industrial hemp products.
- Analysis of the most efficient and economical methods for distributing and transporting Kansas-grown industrial hemp and industrial hemp products.
- Other types of research into the economic development, cultivation, market analysis, manufacturing, distribution and transportation of industrial hemp and industrial hemp products.

Research Proposal Instructions:

- **Complete the following sections**, either by utilizing the fillable form or by providing your answers on a separate page(s). *Handwritten submissions are strongly discouraged.*
- **If answering on a separate document,** please label each section (A-F).
- **Be concise**: Your research proposal should be as concise as possible; **not to exceed 2 pages total.**
- **For more information on how to write a research proposal,** please see the Technical Bulletin on How to Conduct Research on Your Farm or Ranch by visiting https://www.sare.org/Learning-Center/Bulletins/How-to-Conduct-Research-on-Your-Farm-or-Ranch.

SECTION A: Identify your research question and objective, including a statement of the type of research to be conducted and its purpose.

Q1. Which of the approved varieties are best suited for fiber, grain, or CBD production in KS?
Q2. What is the productivity of industrial hemp across a gradient of non-irrigated to fully irrigated conditions in northeast KS?
The objective of the research is to answer the above questions in field conditions in northeast Kansas. The purpose is to generate baseline data evaluating basic production questions to inform recommendations for new hemp growers and to enhance our understanding of the water resource required to produce industrial hemp.

SECTION B: Identify your experimental design.

All experiments will be conducted using a Randomized Complete Block Design with a minimum of four replications per treatment. Variety trials will be planted in 6ft x 40ft plots using a grain drill. Plots will be monitored for growth, weed presence, and insect presence. We will monitor growth and plant health throughout the growing season. To investigate irrigation, two different irrigation regimes will be applied to three varieties representing the grain, fiber, and dual purpose production systems. We will monitor soil moisture and measure plant growth throughout the season.

SECTION C: Explain what will be measured and what data will be collected.

We plan to measure establishment (plants/m^2), final plant height (m), biomass production (ton/acre), and grain yield (lb/acre) of the fiber and grain varieties. We will will collect similar data in the irrigation project and will install soil moisture probes to monitor soil water status in each water regime.

SECTION D: Explain how the project will be implemented, including location and size of your anticipated research areas (in acres or square feet), duration of your research operations and variety of industrial hemp that will be used in your research.

All experiments will be conducted in field MANHF1. We hope to plant in May and harvest at the onset of pollen dispersal (fiber) or when 70% of grain has matured (grain). We don't know exactly when that will be in KS yet. See variety list for varieties to be included in trials.

SECTION E: Explain how research data will be collected, recorded and analyzed.

Data will be collected by employees of the Kansas State Department of Agronomy consistent with our procedures for collecting data from other projects. Data will be written on paper with pencil then transcribed to Excel spreadsheets saved on local computers and in secure cloud platforms. Handwritten data will then be filed and saved in case of computer failure. Data will be analyzed with a common statistical analysis software such as SAS. Data will be subjected to analysis of variance and regression and means will be subjected to a common means separation tool when appropriate.

SECTION F: Explain how the data will be interpreted and how conclusions will be drawn, including anticipated results.

Data will be interpreted after all statistical analyses are completed. Conclusions will be based on that statistical analysis in a manner consistent with academic research ethics standards. We anticipate finding large varietal differences among our research plots. It is expected that some of the approved varieties may not be well adapted to Kansas and result in near crop failure of the variety. We anticipate improved productivity in irrigated plots. However, we will wait to see if the increased productivity justifies the increased monetary and environmental expense of irrigating.

Industrial Hemp Research Report, Kraig Roozeboom[1], Jason Griffin[2], Lucas Haag[1]
Kansas State University Department of [1]Agronomy and [2]Horticulture & Natural Resources

Research Questions:

Q1. Which of the approved varieties are best suited for fiber, grain, or CBD production in KS?

Q2. What is the productivity of industrial hemp across a gradient of non-irrigated to fully irrigated conditions in northeast KS?

Objective:

The objective of the research is to answer the above questions in field conditions in northeast Kansas. The purpose is to generate baseline data evaluating basic production questions to inform recommendations for new hemp growers and to enhance our understanding of the water resource required to produce industrial hemp.

Methods:

All experiments were planted using a Randomized Complete Block Design with four replications per treatment. Variety trials were planted in 6ft x 22ft plots using a grain drill equipped with a seed cone to meter small amounts of seed. Plot size was reduced to account for limited seed supply of some varieties.

Plots were planted on June 4 into a stale seed bed that had weeds controlled with herbicide application the day before planting. Flooding resulting from a rain event on June 22-23 killed enough plants in all plots to render them unusable.

All plots were replanted on July 2, but a large rain event on July 3 flooded plot area again, inhibiting emergence enough that all plots were deemed unusable. Plots could not be replanted a third time because the seed supply had been exhausted and planting date was getting late enough to risk crop failure due to frost.

Data, results, interpretation:

Not applicable because of stand failure due to flooding.